

Sep 17-9:49 AM

Chapter 5: Minerals of Earth's Crust

S.I. What is a mineral?

- A. Minerals are the basic materials of Earth's crust
- B. Minerals are inorganic substances with characteristic physical properties
- C. Four basic questions if it is a mineral
 1. Is the substance inorganic?
 2. Does the substance occur naturally
 3. Does the substance show crystalline form in a solid
 4. Does substance have consistent chemical properties

II. Kind of Minerals (More than 4,000 minerals on Earth)

- A. Common-minerals = rock forming minerals
- B. Silicate Minerals - contain a combo of Si + O (95% of minerals in Earth's crust)

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C. Non-silicate minerals - 4% of Earth's crust

1. Six major groups of non-silicates: carbonates, halides, native elements, oxides, sulfates, sulfides

III Crystalline Structure - all minerals have a crystalline structure

A. Silicate minerals are all made up of the same building blocks: Si-O tetrahedron

1. Combine in different ways to form different silicate minerals

B. 6 kinds of silicate mineral arrangements

student
responsibility
to know
differences

1. Isolated Tetrahedron
2. Ring Silicates
3. Single-chain silicates
4. Double-chain silicates
5. Sheet silicates
6. Framework silicates

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IV Crystalline structure of Nonsilicate minerals

A. Nonsilicate minerals display a variety of crystalline structures

1. chemical structure of nonsilicate mineral determines its characteristics

B. Elements have high densities due to the close packing atoms

1. called closest packing: each atom surrounded by 8 to 12 metal atoms other metal atoms that are as close together as the atom's charges will allow

S.2 Identifying Minerals

→ Mineralogists (Earth Scientists) classify minerals based on their properties

I. Physical properties of minerals

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- A. Color is a physical property that is easy to identify for minerals
1. However, color is unreliable for I.D. of minerals
- B. Color of a mineral powdered form is reliable (mineral streak)
1. Luster - light reflected from minerals surface
- a. Metallic luster - reflects light like a polished metal does
- b. Nonmetallic luster - does not reflect light like a metal: several types
- glassy, waxy, pearly, brilliant, dull/earthy
(quartz) (mica) (diamond) (no shine)
- C. Cleavage and Fracture
1. Minerals that tend to break along a cleavage plane
2. Minerals that tend to break unevenly & along cleavage planes (fracture)

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- a. Fractures described according to their appearance of broken surface
- rough = uneven or irregular surface
- appearance of broken wood = splinty or fibrous fracture
- curved break = conchoidal fracture
- D. Hardness - ability of a mineral to resist scratching
1. Moh's hardness scale set standards of comparison for mineral hardness (Table 1 p. 111)
- E. Crystal shape
1. Mineral crystal forms in one of six basic shapes
- student responsibility to know {
- a. Isometric or cubic system
- b. Orthorhombic system
- c. Tetragonal system
- d. Hexagonal system
- e. Monoclinic system
- f. Triclinic system

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F. Density - depends on kinds of atom that the mineral has and how close they are packed

II Special Properties of Minerals

A. Certain minerals exhibit unique characteristics

1. The ability to glow - fluorescence
2. The ability to glow after UV light is turned off - phosphorescence
3. Displaying a silky appearance - chatoyancy
 - a. also called cats-eye-effect
 - b. result of closely packed parallel fibers
4. Asterism - a mineral displays a six-sided star shape in light

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Name of Mineral Streak Color Hardness

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Bellringer

- What is a mineral?
- If you could mine 1 mineral on Earth, what would it be and how would you go about it?

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Review on Minerals.

Grade: 9th
Subject: Earth Science
Date:

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1 The most common silicate minerals are the?

- ☒ A feldspars
- ☐ B halides
- ☐ C carbonates
- ☐ D sulfates

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2 Ninety-six percent of Earth's crust is made up of ...?

- ☐ A sulfur and lead
- ☒ B silicate minerals
- ☐ C copper and aluminum
- ☐ D nonsilicate minerals

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3 An example of a mineral that has a basic structure consisting of isolated tetrahedra linked by atoms of other elements is ...?

- A mica
- ☒ B olivine
- C quartz
- D feldspar

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4 When two single chains of tetrahedra bond to each other, the result is called a ...?

- A single-chain silicate
- B sheet silicate
- C framework silicate
- ☒ D double-chain silicate

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5 The words waxy, pearly, and dull describe a mineral's...?

luster

,

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6 The words uneven and splintery describe a mineral's ...?

fracture

.

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7 The ratio of a mineral's mass to its volume is the mineral's ...?

density

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8 Double refraction is a property of some crystals of ...?

A mica

B feldspar

C calcite

D galena

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9 Which of the two main groups of minerals is most abundant on Earth?

~~silicates~~ Silicates

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10 A mineral sample has a mass of 51 g and a volume of 15 cm³. What is the density of the mineral sample (units for answer are g/cm³)?

$$\frac{51g}{15cm^3} = 3.4g/cm^3$$

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11 Coal is ...?

- A organic and a mineral
- B inorganic and a mineral
- C organic and not a mineral
- D inorganic and not a mineral

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12 Which mineral can be scratched by a fingernail that has a hardness of 2.5 on the Mohs scale?

- A diamond
- B quartz
- C talc
- D copper

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13 Minerals can be identified by all of the following properties except...

- A color
- B luster
- C hardness
- D streak

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14 All minerals in Earth's crust....

- A have a crystalline structure
- B are classified as ring silicates
- C are classified as pyroxenes and amphiboles
- D have no silicon in their tetrahedral structure

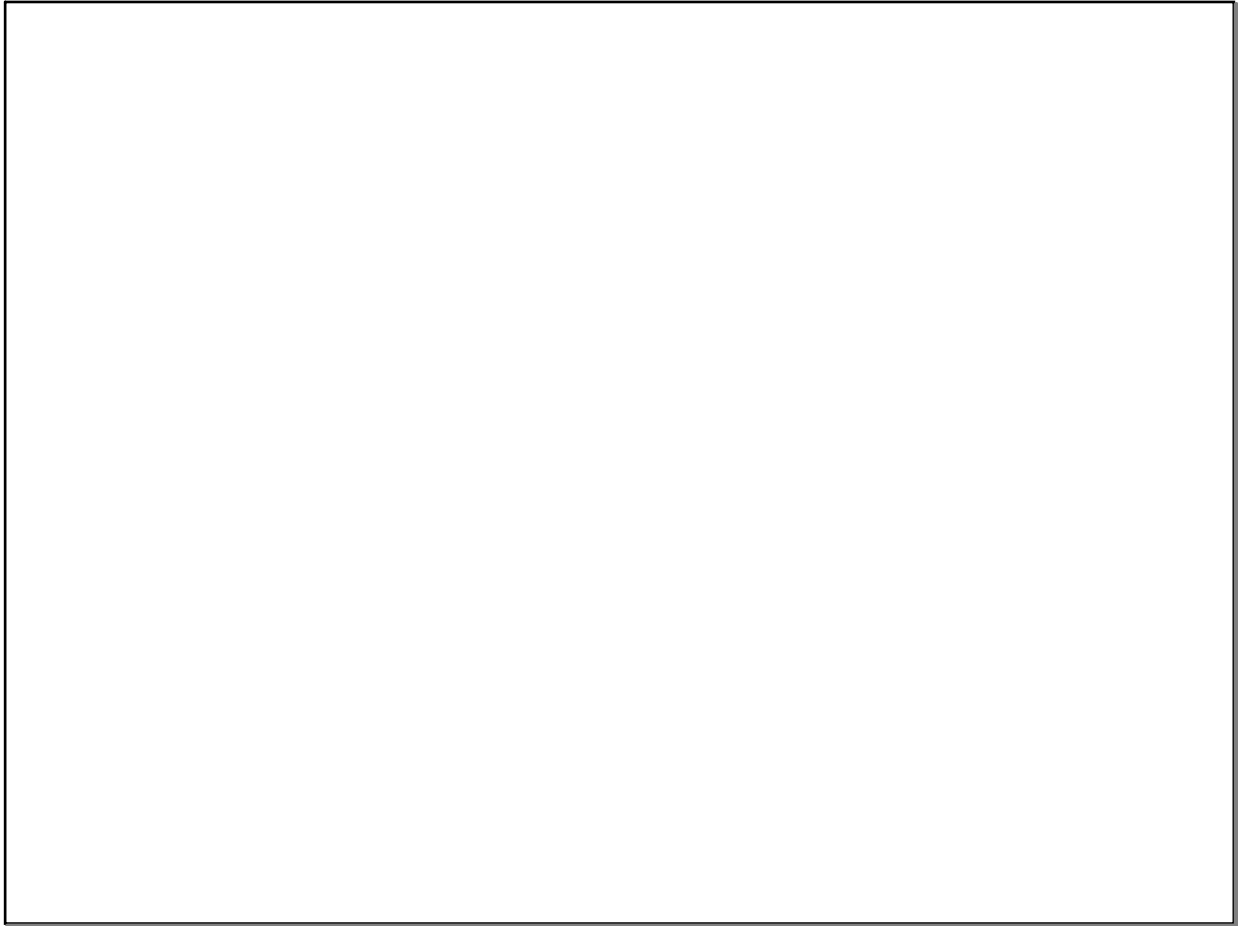
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15 What mineral is made up of only the elements oxygen and silicon?

quartz

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